

REMARKS

The Office Action dated April 23, 2003 has been carefully considered and in response thereto, the current application has been amended and is now believed to be in condition for allowance. Accordingly, reconsideration of this application and allowance of all pending claims is respectfully requested.

✓ Claims 1-33 are pending in the application. The Examiner is thanked for indicating allowable subject matter in claims 4, 13, 15-24 and 26-31. The Applicants respectfully defer presenting amendments to place these claims in independent form until consideration of this Amendment.

✓ The Examiner has rejected claims 2-11, 16-24 and 25-33 under 35 U.S.C. § 112, first paragraph, for containing subject matter not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. Specifically, the Examiner objects to the Applicants' use of the term "PC board" to describe a *flexible* ribbon cable, asserting that the term is well known in the art in reference to a *rigid* insulating sheet with circuits and conducting interconnections thereon. "The applicant may act as his own lexicographer and use the specification to implicitly or explicitly supply new meanings for terms." See Invitrogen Corp. v. Biocrest Manufacturing L.P., 66 USPQ2d 1631 (Fed. Cir. 2003). In this regard, in the Detailed Description of the Preferred Embodiments of the Invention, the Applicants have described the PC board as being *flexible* and made from a ribbon cable (page 5, paragraph 4 thru page 6, paragraph 1). It is believed that the description in the specification is sufficient to enable one skilled in the art to practice the invention. Therefore, it is respectfully requested that the Examiner's 35 U.S.C. § 112, first paragraph rejection to claim 2-11, 16-24 and 25-33 be withdrawn.

Claims 1-24 and 28 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention.

✓ In claim 1, the Examiner states that the meaning of the term "unique pattern" is unclear. As assumed by the Examiner, the term refers to a pattern that does not repeat itself around the code disk, so that any given pattern uniquely identifies a particular location around the code disk.

More specifically, the markings around the circumference of the code disk are divided into equally spaced bits, such that a predetermined number of any consecutively spaced bits forms a unique pattern that identifies a unique rotational position. This features is further described in the specification on page 8, paragraph 1. The Applicants' believe that the description of the "unique pattern" of the markings provided here and in the specification are sufficiently clear and precise and therefore, respectfully request that the rejection of claim 1 be withdrawn.

✓ Claims 4 and 8 are rejected because of the use of the term "PC board" to describe a flexible ribbon cable as recited above with respect to the 35 U.S.C. § 112, first paragraph, rejection. The Applicants' response to the 35 U.S.C. § 112, first paragraph, rejection is hereby incorporated by reference, and it is respectfully requested that the rejection of claims 4 and 8 be withdrawn.

✓ Claim 7 is rejected because the term "LED" lacks antecedent basis. Claim 7 has been amended to change "LED" to --light source--, the antecedent basis for which is found in claim 2. Therefore, it is respectfully requested that the rejection of claim 7 be withdrawn.

✓ Claim 15 is rejected because the use of the terms "outwardly facing gear teeth" and "inside diameter" are confusing. Claim 15 has been amended to remove those terms from the claim. Therefore, it is respectfully requested that the rejection of claim 15 be withdrawn.

✓ Claims 1, 12, 25 and 32 are rejected under 35 U.S.C. § 102(b) as being anticipated by Sano (U.S. Pat. No. 6,130,425). The Examiner's rejections are respectfully traversed.

✓ → Claims 1 and 25 recite a code disk having markings around its circumference, and that a predetermined portion of the markings identify a unique rotational position. Sano discloses a code plate 6 having a plurality of holes 6a which detect "the angle of rotation within one rotation of the code plate 6" (col. 6, line 58 thru col. 7, line 6). Sano does not disclose how the code plate 6 or the holes 6a are used to detect the angle of rotation, and more specifically, it does not disclose a series of marking around the outer circumference of the code plate, portions of which *form unique patterns* to identify a rotational position. In light of Sano's failure to provide a description of how its angles of rotation are detected, and in particular, its failure to show markings around the code disk which form unique patterns, the Applicants submit that Sano does not disclose the invention of claims 1 and 25, and therefore does not anticipate these claims.

So what? ✓ Additionally, Sano discloses an incremental encoder 6 and 9 (col. 7, lines 3-6) which indicate the angle of rotation within one rotation of the code disk 6 and an absolute encoder (i.e. lap counter) which indicates the rotation of the code disk. A brief description of the incremental encoder is provided in the Description of the Related Art (col. 1, lines 14-36) of Sano. Although a detailed description of the incremental encoder is not provided by Sano, it is known in the prior art that it functions by marking a reference position, and keeping track of the angle of rotation (within the single rotation) based on that reference position, which is known as "dead reckoning" the position. If the device loses power, the exact angle of rotational would be lost because the reference position and all the movement from that reference position would be lost (although the number of rotations made would be known from the absolute encoder). In order to function properly, the device would have to pass through a "home" position in order to recalibrate itself. In contrast, the present invention has a marking system around the circumference of the code disk that provides a unique pattern of markings to represent a rotation position without reference to any home position. This allows the present invention to know its exact rotational position at all times, even after a power loss event. For this additional reason, claims 1 and 25 are believed not to be anticipated by Sano.

Claims 12 and 32 depend from claims 1 and 25, for the reasons claims 1 and 25 are believed to be allowable, claims 12 and 32 are also believed to be allowable.

Claims 2, 3, 5-11, 14 and 33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sano. The Examiner's rejections are respectfully traversed. Claims 2, 3, 8-11 and 14 depend from claim 1 above, and for the reasons claim 1 is believed to be allowable these claims are also believed to be allowable.

✓ Furthermore, claims 5, 11 and 33 recite that the markings comprise equally sized bits that form the unique pattern, and that the photodetector is able to read more bits than is necessary to identify a rotation position, thereby enabling it to identify multiple rotational positions simultaneously. More, specifically, the photodetector of the present invention reads the bits prior to and following the true rotational position, so that the position before and after the true position are identified (hence the photodetector reads three consecutive positions). This feature is supported in the specification beginning on page 8, last paragraph to page 9, second paragraph.

The Examiner asserts that Sano discloses at least two detectors 9, and therefore presumably, can detect at least two positions simultaneously. However, as stated earlier, Sano does not disclose how the rotational angle of code plate 6 is detected, and does not disclose that the at least two detectors 9 function to determine more than one position simultaneously. For this reason, Sano does not disclose or suggest the invention of claims 5, 11 and 33.

✓ Claim 6 recites that the photodetector is a charge coupling device (CCD). The Examiner asserts that it would have been an obvious design choice to use a CCD in place of the photo-interrupter 9 disclosed in Sano. However, it would not have been an obvious design choice to use a CCD rather than a photo-interrupter. As an initial matter, it is unclear what a photo-interrupter is because of Sano's failure to disclose its function and operation. For purposes of this argument, it is assumed that the photo-interrupter is a conventional phototransistor which produces an output in the presence of light at a single discrete location. In contrast to the conventional phototransistor, the CCD of the present invention provides a multipixel representation of the code disk (page 8, para. 2). The difference is highlighted by the fact that the cost of a CCD is considerably higher than that of a typical phototransistor.

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Claim 7 recites that the light source is timed to flash concurrently with the reading of the code disk. The Examiner asserts that it is an obvious design choice to strobe the pulse of an LED to conserve energy. However, the flashing of the light source in the present invention is timed not to conserve energy, but to prevent blurring of the image and provide a more accurate position reading (col. 9, para. 1). Applicants respectfully submit that the Examiner's belief that it is an obvious design choice to modify Sano to time the flashing of its light to match the reading of the code plate to conserve energy is hindsight reasoning. This feature is not disclosed in any reference so there is not basis for asserting its obviousness. As there is no teaching or suggestion in any of the references that energy conservation is inadequate or needs to be addressed, and particularly in view of the fact that the Applicants' purpose in strobbing the light is completely different from the Examiner's stated reason for the combination, the Applicants' respectfully traverse the rejection and request that it be withdrawn.

Additionally, new claims 34 and 35 has been added which better define the present invention. Claims 34 and 35 recite that the position sensor has a turn ring which is placed onto a

hub, wherein the turn ring and hub have a different rotational axis. This is not shown in Sano, which shows the code plate 10 and rotating ring 11 having the same rotational axis. Therefore, new claims 34 and 35 are believed to be allowable.

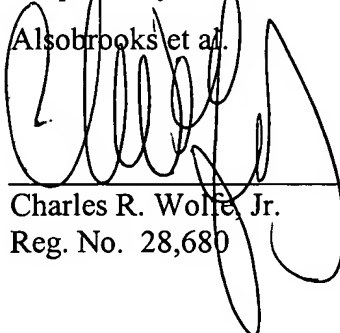
As all grounds of rejection have been addressed and overcome, entry of this Amendment and issuance of a Notice of Allowance of claims 1-35 are respectfully solicited. In the event there are any questions relating to this Amendment or the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

Please charge any shortage or credit any overpayment of fees to Deposit Account No. 23-2185 (115582-00150). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this response, the Applicants hereby petition under 37 CFR 1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized above.

Respectfully submitted,

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